TABLE X1-continued

CFD model geometry and conditions for simulations of cases 1–3.

	Case number		
	1	2	3
Balances			
Mass ([out − in]/in)	2.0e−7	6.5e−15	2.7e−8
Energy ([out − in]/in)	N/A	N/A	N/A

[0311]

TABLE X2

CFD model geometry and conditions for simulations of cases 4–5.

	Case number	
	4	5
Surface feature geometry type	SFG-5.1-45°-cis-A	SFG-5.1-45°-cis-B
Flow direction	Cis-A	Cis-B
Surface feature width (mm)	0.381	0.381
Surface feature depth (mm)	0.254	0.254
Surface feature pitch or tangent to tangent spacing (mm)	0.381	0.381
Surface feature angle (degrees relative to width direction, or orthogonal to bulk flow)	45°	45°
Channel gap modeled (mm)	0.2285	0.457
Full channel gap (mm)	0.457	0.457
Channel width modeled (mm)	4.064	4.064
Full channel width (mm)	4.064	4.064
Channel length upstream of features (cm)	0.381	0.381
Channel length with surface features (cm)	5.588	5.588
Channel length downstream of features (cm)	0.381	0.381
Total number of surface features per surface feature containing wall	51	51
Total number of walls containing surface features	2	2
Number of cells	118,650	284,160
Model symmetry	Half	Full geometry
Wall boundary condition	No-slip	No-slip
Inlet fluid temperature (° C.)	N/A	N/A
Inlet velocity (m/sec)	12.13	12.13
Inlet velocity profile	Uniform	Uniform
Outlet pressure (bar)	25.3	25.3
Reaction enabled?	No	No
Fluid properties		
Density (kg/m3)	5.067	5.067
Viscosity (kg/m-sec)	3.62e−5	3.62e−5
Balances		
Mass ([out − in]/in)	1.4e−15	4.7e−16
Energy ([out − in]/in)	N/A	N/A

The CFD results were analyzed and helped to identify the surface feature characteristics that are discussed below. For the geometry and conditions of case 1 in Table X1, the pathlines of flow become trapped in dead zones in the surface features in the center of the channel width (where the two upstream ends of the surface feature groove leg segments, or angles, meet). The CFD simulation results for case 2 in Table X1 suggest that the trans configuration for this surface feature geometry type creates poorly mixed regions of substantially straight/slightly twisting flow near the center of the main channel gap in those lateral positions across the main channel width which roughly align with the midpoints of each leg segment (or angle) of the surface feature grooves, with the flow near the surface feature containing walls of the main channel swirling around these three central cores of flow. In contrast, the CFD results for the cis configuration of this surface feature geometry (case 3 in Table X1) suggest that the cis configuration mixes much more efficiently across the entire cross section of the main channel flow, having no cores of flow which are not periodically swept into the surface features. Flow lines for case 3 show the same tendency as for other cis configuration cases to pull the bulk of the flow in the main channel toward those those lateral positions across the main channel width